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PRELIMINARY REPORT

Operation REDWING

972.6

PACIFIC PROVING GROUNDS

May - July 1956

[redacted]

Project 4.1

CHORIORETINAL BURNS

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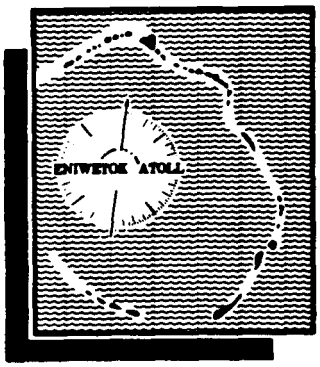
John M. Boyle
DATE: 21 July 1994



HEADQUARTERS FIELD COMMAND, ARMED FORCES SPECIAL WEAPONS PROJECT
SANDIA BASE, ALBUQUERQUE, NEW MEXICO

HRE-60

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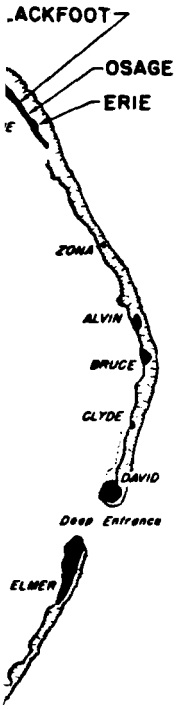

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ABSTRACT

Project 4.1 of Operation REDWING is a sequel to the study of chorioretinal burns during Operation UPSHOT-KNOTHOLE in 1953. In the latter study, weapons of about 20 KT produced burns in the eyes of rabbits at distances of 2 to 42.5 statute miles from ground zero. On all studies prior to REDWING, rabbits were the only experimental animals used to evaluate ocular damage. Four cases of accidental human burns were produced at distances of 2 to 10 miles.

The present study was designed to furnish additional information on the requirements for protection against retinal burns utilizing both rabbits and monkeys as experimental animals. The effectiveness of various parts of the power pulse was evaluated as to its ability to produce chorioretinal burns. This was accomplished by two series of time fractionating shutters. The first group, open at time zero, closed at increasing intervals of time. The second series, closed at time zero, were open for preselected time increments during the flash. The feasibility of protection by fixed-density optical filters was explored. Two types of developmental protective electronic shutters were field tested.

Results at yields of 15.5 KT and 350 KT demonstrated that the blink reflex does not protect against chorioretinal burns. The 15.5-KT shot caused retinal lesions at 8.1 statute miles. The device of intermediate yield, 350 KT, produced burns at 7.6 miles but not as far as 14.4 miles. Burns were not obtained from weapons of 3.5-MT yield at distances of 12.9 and 21.6 miles. The lower effective range of burning at the Pacific Proving Ground (PPG) is attributed to higher atmospheric attenuation from excessive humidity and salt spray from the reefs. Note is made that additional information is needed in order to determine the limiting distance for retinal burns at 350 KT and especially higher yields. Both the 15.5-KT and 350-KT weapons produced retinal burns in two of the eight animals exposed to only the first pulse. Both explosions produced burns during the second pulse.

The optical filters tested at near threshold distances prevented retinal burns. At intermediate distances, filters reduced the incidence and severity of the lesions. The results obtained on protective shutters were inconclusive with respect to protection against retinal burns. However, information was obtained invaluable to the future development of this instrumentation.

Loss of animals from sunstroke or heat prostration during the afternoon of D-1 threatened to be a problem, particularly where repeated shot postponement occurred after the animals were placed in the exposure racks. Also, there was some indication that light reflected to the unexposed eye may have caused blinking before certain of the shutters opened. Recommendations include provision for a trailer type of exposure facility, light-tight and airconditioned.